LONWORKS™ Interoperability Update

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Defining and using network variable structures

During the industry break-out sessions a request was made to provide a mechanism for defining industry specific structures of data. One of the reasons behind this request was that often, data is used in groups and it would be more efficient if it could be transferred as a single network variable structure rather than individual network variables. Instead of just having single SNVTs the idea of a Super-SNVT that contained SNVTs was discussed.

At the application layer SNVTs play a key role in designing interoperable products. SNVTs provide a measurement that is specifically defined in terms of units, range and resolution, so that all manufacturers agree on the interpretation of a particular SNVT. The current list of SNVTs includes numerical values, character strings and structures of data.

Several interoperability issues arise from the request to define industry-specific structures.

1. When a network variable structure is defined within a Neuron C program, even if the components of the structure are SNVTs, the resulting structure is no longer of SNVT type. This means that no automatic type checking is performed at binding time.

2. The positional offsets of elements of a structure are compiler dependent.

3. Structures of network variables can ultimately be more wasteful of network resources, since even if only one element changes within the structure, the whole structure is sent out.

For these reasons Echelon does not recommend pursuing the path of defining industry specific non-SNVT network variable structures. If specific structures of data are needed for interoperability, that are not already supported as individual SNVTs, they can be added as additional SNVTs.

Object Definitions

A more fruitful approach in the long term is probably offered by the concept of object definition which several LonWorks customers are already working on. An interoperable object represents a set of SNVTs and provide a framework for making logical connections between LonWorks based products. A product may comprise a single object or several objects. Echelon will be investigating this approach further and will report progress in the next update. As a starting point a group of European customers developed the following definitions for interoperable switch and lamp products:

Object	Input/Output	SNVT type	Function
Switch	Output State	SNVT_lev_disc	discrete on/off control independent of level
	Output Level	SNVT_lev_cont	level control
	Input State	SNVT_lev_disc	feedback from controlled devices
	Input Level	SNVT_lev_cont	continuous level feedback
Lamp	Input State	SNVT_lev_disc	discrete on/off control independent of level
	Input Level	SNVT_lev_cont	level control
	Output State	SNVT_lev_disc	feedback to sensors
	Output Level	SNVT_lev_cont	continuous level feedback

Network management tools that manipulate these objects can be built into Neuron® Chip based installation tools, and LonManager™ API based network management tools. These tools can provide object binding capabilities.

Time stamping of Information

The nature of a distributed control architecture provides an interesting twist to discussions of time based events. A distributed control system can not be used to communicate time between nodes. The difference in time delay between nodes receiving a time message leads to unacceptable time inaccuracies.

For applications that require a time-based log be kept, this can be done locally at a node by using a real-time clock. The information can be periodically uploaded as a file using the data file transfer protocol outlined in the LonWorks Interoperability Guidelines. Any applications that require time should include a real time clock in the node hardware.

Floating Point SNVTs

Floating point SNVTs do provide greater flexibility in handling range and resolution of physical quantities. However in order to use floating point SNVTs the node must have sufficient processing power to perform floating point math or at least sufficient memory to handle the conversion routines between floating point and fixed point numbers. A 3120-based node is not suitable for manipulating floating point numbers due to memory constraints.

For instruments that have a very large operating range a decision must be made on which network variables to provide. To allow communication of SNVT information to and from 3120-based nodes either of the following options could be implemented:

1) Include several SNVTs that cover the complete operating range.

2) Provide both floating point and fixed point SNVTs to cover all the possible products that this instrument could interoperate with.

At installation time the appropriate network variable connections can be made.

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